

WHAT IS CLAIMED IS:

1. 1. A monolithic microwave integrated circuit, comprising:
 2. an amplifier circuit having a group delay variation verses frequency
 3. characteristic; and
 4. a group delay equalizer circuit integrated with said amplifier circuit to
 5. compensate for said group delay variation verses frequency characteristic of said amplifier
 6. circuit.
1. 2. The circuit of Claim 1, wherein said amplifier circuit is capable of receiving an input signal having a frequency range, amplifying said input signal and producing an output signal corresponding to said amplified input signal, said group delay equalizer circuit being further capable of maintaining near constant group delay of frequencies within said frequency range of said input signal to prevent distortion of said output signal.
1. 3. The circuit of Claim 1, wherein said group delay equalizer circuit comprises between 3 and 20 percent of the area of said monolithic microwave integrated circuit.
1. 4. The circuit of Claim 1, wherein said group delay equalizer circuit is capable of compensating for said group delay variation verses frequency characteristic of said amplifier circuit to frequencies above 50 GHz.

1 5. The circuit of Claim 1, wherein said amplifier circuit is a distributed amplifier
2 circuit.

1 6. The circuit of Claim 5, wherein said distributed amplifier circuit comprises one
2 or more stages, each of said one or more stages including a common source field-effect
3 transistor, a bipolar transistor or a cascode field-effect transistor structure.

1 7. The circuit of Claim 1, wherein said amplifier circuit is a feedback amplifier
2 circuit.

1 8. The circuit of Claim 1, wherein said group delay equalizer circuit comprises
2 one or more sections, each of said sections having a different group delay response.

1 9. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed at the input of said amplifier circuit.

1 10. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed at the output of said amplifier circuit.

1 11. The circuit of Claim 8, wherein at least one of said one or more sections is
2 placed between one or more stages of said amplifier circuit.

1 12. The circuit of Claim 8, wherein said one or more sections are cascaded
2 together to form a composite group delay response capable of compensating for said group
3 delay variation verses frequency characteristic of said amplifier circuit.

1 13. The circuit of Claim 8, wherein at least one of said one or more sections has
2 least one microstrip line inductive over a specific frequency range and at least one capacitor to
3 create a specific phase response over at least a portion of the frequency range of said amplifier
4 circuit.

1 14. The circuit of Claim 13, wherein at least one of said one or more sections is a
2 filter selected from the group consisting of: an LC filter, a bridged LC filter, an RC filter and
3 an RLC filter.

1 15. The circuit of Claim 13, wherein at least one of said one or more sections is a
2 filter with a microstrip transformer.

1 16. The circuit of Claim 1, further comprising:
2 a substrate, said amplifier circuit and said group delay equalizer circuit being
3 fabricated in said substrate.

1 17. The circuit of Claim 16, wherein said substrate is made from a material selected
2 from the group consisting of: a III-V material, a II-VI material and a heterostructure material.

1 18. The circuit of Claim 1, wherein said group delay equalizer circuit is further
2 capable of allowing a near constant gain response to be achieved over the frequency range of
3 said amplifier circuit.

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1 19. A method for providing a near constant group delay over a frequency range of
2 a amplifier circuit, comprising the steps of:

3 providing said amplifier circuit within a monolithic microwave integrated
4 circuit, said amplifier circuit having a group delay response variation verses frequency
5 characteristic; and

6 integrating a group delay equalizer circuit with said amplifier circuit on said
7 monolithic microwave integrated circuit to compensate for said group delay variation verses
8 frequency characteristic of said amplifier circuit.

1 20. The method of Claim 19, further comprising the steps of:
2 receiving an input signal having a frequency range at said amplifier circuit;
3 amplifying said input signal to produce an output signal corresponding to said
4 amplified input signal; and
5 maintaining, by said group delay equalizer circuit, near constant group delay of
6 frequencies within said frequency range of said input signal to prevent distortion of said output
7 signal.

1 21. The method of Claim 19, wherein said group delay equalizer circuit comprises
2 between 3 and 20 percent of the area of said monolithic microwave integrated circuit.

1 22. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:
3 compensating, by said group delay equalizer circuit, for said group delay
4 variation versus frequency characteristic of said amplifier circuit to frequencies above 50 GHz.

1 23. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:

3 integrating one or more sections of said group delay equalizer circuit with said
4 amplifier circuit on said monolithic microwave integrated circuit, each of said sections having
5 a different group delay response.

1 24. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections at the input of said amplifier
4 circuit.

1 25. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections at the output of said amplifier
4 circuit.

1 26. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 placing at least one of said one or more sections between one or more stages of
4 said amplifier circuit.

1 27. The method of Claim 23, wherein said step of integrating said one or more
2 sections further comprises the step of:

3 cascading said one or more sections together to form a composite group delay
4 response capable of compensating for said group delay variation verses frequency
5 characteristic of said amplifier circuit.

1 28. The method of Claim 19, wherein said step of integrating further comprises the
2 step of:

3 integrating said group delay equalizer circuit with said amplifier circuit on said
4 monolithic microwave integrated circuit to allow a near constant gain response to be achieved
5 over the frequency range of said amplifier circuit.